Natural Oil 'Spills': Surprising Amount Seeps into the Sea

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The infamous 1989 Exxon Valdez oil spill, one of the largest in U.S. history, dumped more than 10 million gallons of crude into Prince William Sound.

While the amount of oil and its ultimate fate in such manmade disasters is well known, the effect and size of natural oil seeps on the ocean floor is murkier. A new study finds that the natural petroleum seeps off Santa Barbara, Calif., have leaked out the equivalent of about eight to 80 Exxon Valdez oil spills over hundreds of thousands of years.

These spills create an oil fallout shadow that contaminates the sediments around the seep, with the oil content decreasing farther from the seep.

There is effectively an oil spill every day at Coal Oil Point (COP), the natural seeps off Santa Barbara where 20 to 25 tons of oil have leaked from the seafloor each day for the last several hundred thousand years. The oil from natural seeps and from man-made spills are both formed from the decay of buried fossil remains that are transformed over millions of years through exposure to heat and pressure.

"One of the natural questions is: What happens to all of this oil?" said study co-author Dave Valentine of the University of California, Santa Barbara. "So much oil seeps up and floats on the sea surface. It's something we've long wondered. We know some of it will come ashore as tar balls, but it doesn't stick around. And then there are the massive slicks. You can see them, sometimes extending 20 miles [32 kilometers] from the seeps. But what really is the ultimate fate?"

Based on their previous research, Valentine and his co-authors surmised that the oil was sinking "because this oil is heavy to begin with," Valentine said. "It's a good bet that it ends up in the sediments because it's not ending up on land. It's not dissolving in ocean water, so it's almost certain that it is ending up in the sediments."

The team sampled locations around the seeps to see how much oil was leftover after "weathering" — dissolving into the water, evaporating into the air, or being degraded by microbes.

Microbes consume most, but not all, of the compounds in the oil. The next step of the research is to figure out just why that is.

"Nature does an amazing job acting on this oil but somehow the microbes stopped eating, leaving a small fraction of the compounds in the sediments," said study co-author Chris Reddy, a marine chemist with the Woods Hole Oceanographic Institution in Falmouth, Mass. "Why this happens is still a mystery, but we are getting closer."

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